

20. A separation membrane comprising,

- (a) a support for a hollow fiber separation membrane made of a collection of shrunken yarns; and,
- (b) a porous substance attached to the support after the yarns have been shrunken, the porous substance covering the outer circumferential surface of the support and having pores suitable for use as a separation membrane.

21. The membrane of claim 20 wherein the yarns are shrunken to a stable length and the support with shrunken yarns has an extension at break of at least 10%.

22. The membrane of claims 20 wherein the support has a pre-shrunk length that is at least 1% less than an un-shrunk length of the support.

23. The membrane of claim 22 wherein the support has a pre-shrunk length that is between 1% and 20% less than an un-shrunk length of the support.

24. The membrane of claim 23 wherein the support has a pre-shrunk length that is between 1% and 8% less than an un-shrunk length of the support.

25. The membrane of a claim 20 wherein the support is flexible, macroporous and tubular.

26. The membrane of claim 21 wherein the support has an extension at break of at least 20%.

27. The membrane of claim 20 wherein the air permeability of the support without the porous substance attached is at least 1 cc/sec/cm² at 1.378 kPa.

28. The membrane of claim 27 wherein the air permeability of the support without the porous substance attached is less than about 10 cc/sec/cm² at 1.378 kPa.

29. The membrane of claim 20 wherein the porous substance is at least 0.05 mm thick from the outer surface of the support to the outside of the porous substance.

30. The membrane of claim 20 wherein the porous substance is between 0.5 mm and 3.0 mm thick beyond the outer surface of the support to the outside of the porous substance.

31. The membrane of claim 30 wherein the porous substance is less than 2.0 mm thick beyond the outer surface of the support to the outside of the porous substance.

32. The membrane of claim 20 wherein the support is not embedded in the porous substance.

33. The membrane of claim 20 wherein the yarns are formed from a synthetic resin.

34. The membrane of claim 20 wherein the yarns are selected from polyester, polyamide, polyolefin, polyamine, polyurethane, polysulfone or cellulose acetate.

35. The membrane of claim 20 wherein the yarns are selected from the group of polyester or polyamide.

36. The membrane of claim 20 wherein the support is generally tubular and has an inside diameter of 0.5 mm or more and an outside diameter of 3 mm or less.

37. The membrane of claim 20 wherein the support is generally tubular and has a wall thickness between about 0.2 mm and 1 mm.

38. The membrane of claim 20 wherein the yarns are woven into a tubular braid.

39. The membrane of claim 38 wherein the support has at least 30 picks (crosses per inch).

40. The membrane of claim 20 wherein the support comprises at least 16 separate yarns and is woven with from 1 to 3 multifilament ends with at least 30 picks (crosses/inch).

41. The membrane of claim 21 wherein the support comprises from about 16 to 60 separate yarns, each on its own carrier, each yarn being multifilament 150 to 500 denier (g/9000m) yarn, each multifilament being made with from 25 to 750 filaments, each filament being from 0.5 to 7 denier, and is woven with from 1 to 3 multifilament ends at from 30 to 45 picks (crosses/inch), with a wall thickness in the range from about 0.2 mm but less than three times the diameter of the yarns.

42. The membrane of any of claim 38 wherein the support has separate yarns woven in a pattern selected from Diamond, Regular or Hercules

43. The membrane of claim 20 wherein the support comprises a tubular braid woven with from 1 to 3 multifilament ends, and the ends are non-plied in each yarn but lie linearly adjacent each other until taken up to form the braid.

44. The membrane of claim 20 wherein the porous substance has pores of a size suitable for use as a microfiltration or ultrafiltration membrane.

45. The membrane of claim 20 wherein the support has a moisture regain of .2% to 7% by weight.

46. A process of making a separation membrane comprising the steps of,

(a) providing a support for a hollow fiber separation membrane made of a collection of shrunken yarns; and,

(b) attaching a porous substance to the support after the yarns have been shrunken, the porous substance covering the outer circumferential surface of the support and having pores suitable for use as a separation membrane.

47. The process of claim 46 wherein the yarns are shrunken to a stable length and the support with shrunken yarns has an extension at break of at least 10%.

48. A separation membrane comprising,

(a) a support for a hollow fiber separation membrane made of a collection of yarns braided into a tube; and,

(b) a porous substance attached to and covering the outer circumferential surface of the support and having pores suitable for use as a separation membrane, wherein,

(c) the air permeability of the support without the porous substance attached is at least 1 cc/sec/cm² at 1.378 kPa; and,

(d) the support has at least 30 crosses per inch.

49. The membrane of claim 48 wherein the support comprises at least 16 separate yarns and is woven with from 1 to 3 multifilament ends.

50. The membrane of claim 49 wherein the support comprises from about 16 to 60 separate yarns, each on its own carrier, each yarn being multifilament 150 to 500 denier (g/9000m) yarn, each multifilament being made with from 25 to 750 filaments, each filament being from 0.5 to 7 denier, and is woven with from 1 to 3 multifilament ends at from 30 to 45 picks (crosses/inch), with a wall thickness in the range from about 0.2 mm but less than three times the diameter of the yarns.

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51. The membrane of claim 48 wherein the support has separate
yarns woven in a pattern selected from Diamond, Regular or Hercules

52. The membrane of claim 48 wherein the support comprises a tubular braid woven with from 1 to 3 multifilament ends, and the ends are non-plied in each yarn but lie linearly adjacent each other until taken up to form the braid.

53. The membrane of claim 48 wherein the air permeability of the support without the porous substance attached is less than about 10 cc/sec/cm² at 1.378 kPa.

54. The membrane of claim 48 wherein the yarns are pre-shrunk to a stable length.

55. The membrane of claims 48 wherein the support has an extension at break of at least 10%.

56. The membrane of claim 48 wherein the support has a pre-shrunk length that is at least 1% less than an un-shrunk length of the support.

57. The membrane of claim 56 wherein the support has a pre-shrunk length that is between 1% and 20% less than an un-shrunk length of the support.

58. The membrane of claim 57 wherein the support has a pre-shrunk length that is between 1% and 8 % less than an un-shrunk length of the support.

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59. The membrane of claim 48 wherein the support is flexible, macroporous and tubular.

60. The membrane of claim 48 wherein the support has an extension at break of at least 20%.

61. The membrane of claim 48 wherein the porous substance is at least 0.05 mm thick from the outer surface of the support to the outside of the porous substance.

62. The membrane of claim 61 wherein the porous substance is between 0.5 mm and 3.0 mm thick beyond the outer surface of the support to the outside of the porous substance.

63. The membrane of claim 48 wherein the porous substance is less than 2.0 mm thick beyond the outer surface of the support to the outside of the porous substance.

64. The membrane of claim 48 wherein the support is not embedded in the porous substance.

C 65. The membrane of claim 48 wherein the yarns are formed from a synthetic resin.

66. The membrane of claim 65 wherein the yarns are selected from polyester, polyamide, polyolefin, polyamine, polyurethane, polysulfone or cellulose acetate.

67. The membrane of claim 66 wherein the yarns are selected from the group of polyester or polyamide.